

WHAT IS CLAIMED IS:

1. A liquid crystal display device, comprising:

a first substrate;

a second substrate;

a liquid crystal layer interposed between the first substrate and the second substrate;

a first polarizer provided on a surface of the first substrate which is on the opposite side to the liquid crystal layer;

a second polarizer provided on a surface of the second substrate which is on the opposite side to the liquid crystal layer;

a first phase compensation element provided between the first polarizer and the liquid crystal layer; and

a second phase compensation element provided between the second polarizer and the liquid crystal layer,

wherein a plurality of pixel areas are provided for display,

the first substrate includes at least one transmissive electrode, and the second substrate includes a reflective electrode region and a transmissive electrode

region in correspondence with each of the plurality of pixel areas.

2. A liquid crystal display device according to claim 1, wherein each of the plurality of pixel areas has a reflective region for performing display using reflected light and a transmissive region for performing display using transmitted light, and the reflective electrode region defines the reflective region and the transmissive electrode region defines the transmissive region.

3. A liquid crystal display device according to claim 1, wherein the liquid crystal layer has a retardation of zero when a molecular axis of liquid crystal molecules in the liquid crystal layer is substantially vertical with respect to the surface of the first and second substrates, and the first phase compensation element and the second phase compensation element each have a retardation which fulfills $\lambda/4$ condition.

4. A liquid crystal display device according to claim 2, wherein the liquid crystal layer has a retardation of α when a molecular axis of liquid crystal molecules in the liquid crystal layer is almost vertical with respect to

the surface of the first and second substrates, and the first phase compensation element has a retardation which fulfills $\lambda/4-\alpha$ condition.

5. A liquid crystal display device according to claim 2, wherein the liquid crystal layer has a retardation of α when a molecular axis of liquid crystal molecules in the liquid crystal layer is almost vertical with respect to the surface of the first and second substrates, the first phase compensation element has a retardation which fulfills $\lambda/4-\alpha$ condition, and the second phase compensation element has a retardation which fulfills $\lambda/4-(\beta-\alpha)$ condition.

6. A liquid crystal display device according to claim 1, wherein the first phase compensation element and the second phase compensation element are each formed of a $\lambda/4$ wave plate, a transmission axis of the first polarizer and the first phase compensation element make an angle of about 45 degrees, and a transmission axis of the second polarizer and the second phase compensation element make an angle of about 45 degrees.

7. A liquid crystal display device according to claim 2,

wherein the second phase compensation element is formed of a $\lambda/4$ wave plate, and a slower optic axis of the second phase compensation element matches one of a longer axis or a shorter axis of elliptically polarized light transmitted through the liquid crystal layer and incident on the second phase compensation element so as to convert the elliptically polarized light into linearly polarized light, and a transmission axis of the second polarizer is perpendicular to a polarizing axis of the linearly polarized light.

8. A liquid crystal display device, comprising:

a first substrate including a transmissive electrode;

a second substrate including a reflective electrode;

a liquid crystal layer interposed between the first substrate and the second substrate and including liquid crystal molecules which exhibit negative dielectric anisotropy and are aligned substantially vertically to surfaces of the first substrate and the second substrate when no voltage is applied;

a polarizer provided on a surface of the first substrate which is opposite to the liquid crystal layer;

and

a $\lambda/4$ wave plate provided between the polarizer and the liquid crystal layer,

wherein a slower axis of the $\lambda/4$ wave plate and a transmission axis of the polarizer make an angle of about 45 degrees.

9. A liquid crystal display device according to claim 8, further including a phase compensation element between the reflection electrode and the polarizer.

10. A liquid crystal display device, comprising:

a first substrate;

a second substrate;

a liquid crystal layer interposed between the first substrate and the second substrate and including liquid crystal molecules which exhibit negative dielectric anisotropy and are aligned substantially vertically to surfaces of the first substrate and the second substrate when no voltage is applied;

a first polarizer provided on a surface of the first substrate which is on the opposite side to the liquid crystal layer;

a second polarizer provided on a surface of the

second substrate which is on the opposite side to the liquid crystal layer;

a first $\lambda/4$ wave plate provided between the first polarizer and the liquid crystal layer; and

a second $\lambda/4$ wave plate provided between the second polarizer and the liquid crystal layer,

wherein a plurality of pixel areas are provided for display,

the first substrate includes at least one transmissive electrode, and the second substrate includes a reflective electrode region and a transmissive electrode region in correspondence with each of the plurality of pixel areas, and

slower axes of the first $\lambda/4$ wave plate and the second $\lambda/4$ wave plate are in an identical direction and make an angle of about 45 degrees with each of transmission axes of the first polarizer and the second polarizer.

11. A liquid crystal display device according to claim 10, wherein each of the plurality of pixel areas has a reflective region for performing display using reflected light and a transmissive region for performing display using transmitted light, and the reflective

electrode region defines the reflective region and the transmissive electrode region defines the transmissive region.

12. A liquid crystal display device according to claim 10, further including at least one phase compensation element between the first polarizer and the second polarizer.

13. A liquid crystal display device according to claim 10, wherein the liquid crystal layer further includes a chiral dopant.

14. A liquid crystal display device according to claim 13, wherein the liquid crystal layer has an approximately 90 degree twisted orientation.

15. A liquid crystal display device according to claim 1, wherein the first polarizer and the second polarizer have transmission axes perpendicular to each other, and the first phase compensation element and the second phase compensation element have slower axes perpendicular to each other.

16. A liquid crystal display device according to claim 1, wherein the first phase compensation element converts linearly polarized light from the first polarizer into circularly polarized light, and the second phase compensation element converts linearly polarized light from the second polarizer into circularly polarized light, the liquid crystal display device further including a third phase compensation element provided between the first polarizer and the liquid crystal layer for compensating for wavelength dependency of refractive index anisotropy of the first phase compensation element.

17. A liquid crystal display device according to claim 16, wherein the third phase compensation element is a $\lambda/2$ wave plate, and when a transmission axis of the first polarizer and a slower axis of the third phase compensation element make an angle of γ_1 , the transmission axis of the first polarizer and a slower axis of the first phase compensation element make an angle of $2\gamma_1+45$ degrees.

18. A liquid crystal display device according to claim 16, further including a fourth phase compensation element provided between the second polarizer and the

liquid crystal layer for compensating for wavelength dependency of refractive index anisotropy of the second phase compensation element.

19. A liquid crystal display device according to claim 18, wherein the fourth phase compensation element is a $\lambda/2$ wave plate, and when a transmission axis of the second polarizer and a slower axis of the fourth phase compensation element make an angle of γ_2 , the transmission axis of the second polarizer and a slower axis of the second phase compensation element make an angle of $2\gamma_2+45$ degrees.

20. A liquid crystal display device according to claim 18, wherein the transmission axis of the first polarizer is perpendicular to the transmission axis of the second polarizer, a slower axis of the first phase compensation element is perpendicular to the slower axis of the second phase compensation element, and a slower axis of the third phase compensation element is perpendicular to the slower axis of the fourth phase compensation element.

21. A liquid crystal display device, comprising:

- 211 -

a first substrate;
a second substrate; and
a liquid crystal layer interposed between the first substrate and the second substrate,

wherein a plurality of pixel areas are provided for display, each of the plurality of pixel areas having a reflective region for performing display using reflected light and a transmissive region for performing display using transmitted light,

the first substrate includes a counter electrode in the vicinity of the liquid crystal layer,

the second substrate includes, in the vicinity of the liquid crystal layer, a plurality of gate lines, a plurality of source lines perpendicular to the plurality of gate lines, a plurality of switching elements provided in the vicinity of intersections of the plurality of gate lines and the plurality of source lines, a first conductive layer having a high light transmission efficiency, and a second conductive layer having a high light reflection efficiency, the first conductive layer and the second conductive layer being connected to each of the switching elements, connected to each other, and being provided in each of the pixel areas.

22. A liquid crystal display device according to claim 21, further including an insulating layer between the first conductive layer and the second conductive layer.

23. A liquid crystal display device according to claim 21, wherein the second substrate further includes a third conductive layer, and the first conductive layer and the second conductive layer are connected to each other through the third conductive layer.

24. A liquid crystal display device according to claim 23, wherein one of the first conductive layer, the second conductive layer and the third conductive layer is formed of a material identical with one of materials forming the plurality of gate electrodes or the plurality of source electrodes.

25. A liquid crystal display device according to claim 22, wherein the insulating layer has a wave-like surface below the second conductive layer.

26. A method for producing a liquid crystal display device, including

a first substrate;

a second substrate; and

a liquid crystal layer interposed between the first substrate and the second substrate,

wherein a plurality of pixel areas are provided for display, each of the plurality of pixel areas having a reflective region for performing display using reflected light and a transmissive region for performing display using transmitted light,

the first substrate includes a counter electrode in the vicinity of the liquid crystal layer,

the second substrate includes, in the vicinity of the liquid crystal layer, a plurality of gate lines, a plurality of source lines perpendicular to the plurality of gate lines, a plurality of switching elements provided in the vicinity of intersections of the plurality of gate lines and the plurality of source lines, a first conductive layer having a high light transmission efficiency, a second conductive layer having a high light reflection efficiency, the first conductive layer and the second conductive layer being connected to each of the switching elements, connected to each other, and being provided in each of the pixel areas, and an insulating layer provided between the first conductive layer and the second

conductive layer, the method comprising the steps of:

forming the first conductive layer on a plate;

forming the insulating layer at least on the first conductive layer;

forming the second conductive layer on the insulating layer; and

partially removing the second conductive layer formed on the first conductive layer.

27. A method for producing a liquid crystal display device according to claim 26, further including the steps of:

forming a third conductive layer on a connection area, on at least the first conductive layer, for connecting the first conductive layer and the second conductive layer so as to connect the first conductive layer and the second conductive layer to each other through the third conductive layer;

forming the insulating layer; and

partially removing the insulating layer at least on the connection area for connecting the first conductive layer and the second conductive layer.

28. A method for producing a liquid crystal display

device according to claim 26, wherein the step of partially removing the insulating layer includes the step of removing the insulating layer on an area of the first conductive layer.

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